
A new genus *Austrohondaella* (Bryopsida, Hypnaceae) from Australasia

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Abstract

The taxonomic position of *Isopterygium limatum* (Hook.f. & Wilson) Broth. has been re-evaluated. Some morphological characters, such as cylindrical capsules, conic and non-rostrate opercula, well-differentiated annuli, pseudoparaphyllia shape, and axillary, papillose rhizoids suggest that the species should be excluded from the genus *Isopterygium*. A new genus, *Austrohondaella* Z.Iwats., H.P.Ramsay & Fife is therefore described here for *Isopterygium limatum*. This new genus should be classified in the family Hypnaceae.

Introduction

During studies on the genus *Isopterygium* for the floras of Australia and of New Zealand, it was noted separately by Fife and Iwatsuki that certain characteristics such as the erect capsule and operculum form, presence of an annulus, form of pseudoparaphyllia, and axillary and papillose rhizoids in *Isopterygium limatum* were not characteristic of the genus *Isopterygium* as outlined by Iwatsuki (1970, 1987) and Iwatsuki and Ramsay (2009). The common morphological features such as lanceolate leaves with a usually entire leaf margin, papillose axillary rhizoids and a differentiated annulus suggest that it might be a species of *Isopterygiopsis* (Fife in Seppelt 2004: 186). However, other features of *I. limatum* such as its erect capsules, bluntly conic opercula, narrowly foliose pseudoparaphyllia, etc are not consistent with this suggestion.

Sporophytic characters of *I. limatum* are quite different from those of both *Isopterygium tenerum*, the lectotype species for the genus *Isopterygium*, and *I. albescens* which is widely distributed in Australasia, eastern Asia and Oceania. In the genus *Isopterygium*, erect and almost symmetrical capsules occur only in *I. limatum*. However, erect symmetrical capsules are not rare in Hypnaceae; for example, some species of *Hondaella*, *Platygyrimu*, *Pylasia*. Species of *Isopterygium* s.s., including *I. albescens* and *I. tenerum*, lack a differentiated annulus and have apiculate or obliquely short-rostrate opercula while *I. limatum* has both a well differentiated and deciduous annulus of 2 or 3 rows of cells and a bluntly conic operculum.

Some gametophytic characters of *Isopterygium limatum* are also clearly anomalous in the genus *Isopterygium*, according to the criteria set out by Iwatsuki (1987) and cited in Ireland (1991). Species of *Isopterygium* have filamentous pseudoparaphyllia, while *I. limatum* has narrowly foliose pseudoparaphyllia, similar to those of species of *Ectropothecium*. The leaves of *I. limatum* are characteristically strongly secund giving the species something of the appearance of *Hypnum*, while those of *Isopterygium* are usually more or less complanate, erect spreading or only moderately secund. Rhizoids commonly arise on stems between leaf insertions and are smooth in most species of *Isopterygium* whereas they are axillary and papillose in *I. limatum*. These differences are significant enough to require a new genus for this interesting moss, and we propose the name *Austrohondaella*.

The new monotypic genus *Austrohondaella* shares some common characters with *Hondaella*, a genus of Hypnaceae recorded from eastern Asia (Japan, China, Korea, Laos, Myanmar, Thailand, and Russia). Illustrations of the type species of *Hondaella*, *H. aulacophylla* Dixon & Sakurai (= *H. brachytheciella* (Broth. & Paris) Ando) are available in Sakurai (1938) and Noguchi (1994). Species of *Hondaella* and *Austrohondaella* have erect capsules, similar leaf shape, entire leaf apices, hypnaceous peristomes, etc. However, the pseudoparaphyllia of *Hondaella* are much larger, and wider, than those of *Austrohondaella*. Moreover, the annulus is not differentiated, and leaves are truncate at the base in *Hondaella*.

Austrohondaella Z.Iwats., H.P.Ramsay & Fife, **gen. nov.**; **fam. Hypnacearum**

Plantae mediocres dioicae; caulis prostratus; stratum corticale e cellulis incrassatis compositum; rhizoidea papillosa axillariaeque; folia anguste ovato-lanceolata; nervis binis brevissimus; pseudoparaphyllia anguste foliosa; alae foliorum non decurrentes; cellulae foliorum angustissime prosenchymaticae; thecae ovoideae; annulus distinctus; operculum conicum.

Type species: *Hypnum limatum* Hook.f. & Wilson, *Fl. Antarct.* 2 (Suppl.): 545 (1847); *Isopterygium limatum* (Hook.f. & Wilson) Broth., *Nat. Pflanzenfam.* 1(3): 1080 (1908).

Etymology: the generic name reflects the morphological similarities to the Asian genus *Hondaella* and the Australian/New Zealand distribution of the type species.

Plants dioicous. Stems creeping, irregularly branched, epidermal cells small and more or less thick-walled in cross-section; pseudoparaphyllia narrowly foliose, base 2 or 3 cells wide. Rhizoids axillary, red, papillose. Leaves narrowly lanceolate, often falcate to falcate-secund, base rounded, not decurrent; upper portion of leaf gradually narrowed to piliferous apex; costa weak and short, often absent; cells in median portion of lamina linear to subvermicular; basal cells shorter. Perichaetia lateral on stems; perichaetial leaves lanceolate, entire, ecostate with apex narrowly acute. Setae long exserted; capsules cylindrical, erect, mostly symmetrical, sometimes slightly asymmetrical; operculum bluntly conic, apex obtuse; annulus well developed; peristome teeth hypnaceous.

Austrohondaella limata (Hook.f. & Wilson) Z.Iwats., H.P.Ramsay & Fife, **comb. nov.**

Hypnum limatum Hook.f. & Wilson, *Fl. Antarct.* 2 (Suppl.): 545 (1847). Type: Campbell's Island, Antarct. Exp. 1839–1843, *J. D. Hooker*; holotype BM (*n.v.*); isotype: NY. *Isopterygium limatum* (Hook.f. & Wilson) Broth., *Nat. Pflanzen.* 1(3): 1080 (1908).

Hypnum terrae-novae Brid. var. *australe* Hook.f. & Wilson, *Fl. Antarct.* 1: 142 (1845).

Ectropothecium australe (Hook.f. & Wilson) A.Jaeger, *Ber. S. Gall. Naturw. Ges.* 1877–78: 260 (1880) *nom. illeg. incl. spec. prior.*

Leskea amblyocarpa Hampe, *Linnaea* 30: 638 (1860). Type: Victoria, Apollo Bay, F. Mueller 50; holotype: BM. *Isopterygium amblyocarpum* (Hampe) Broth., *Nat. Pflanzenfam.* 1(3): 1080 (1908). *syn. nov.*

Isopterygium acuminatum Bosw., *J. Bot.* 30: 99 (1892). Type: Tasmania, Glen Rae, 1891, W.A. Weymouth [555]; holotype: HO 73037; isotype: NY. *syn. nov.*

Illustrations: Hooker (1847, Plate LXI, fig. IV, as *Hypnum terrae-novae*); Sainsbury (1955, Plate 74, fig 3, as *Isopterygium limatum*); Seppelt (2004, fig. 74, as *Isopterygium limatum*).

Plants dioicous, yellow or golden-green, glossy, forming dense mats. Stems creeping, 1–2 cm long, irregularly branched; branches short, usually up to 5 mm long. Cross-sections of stem round to more or less triangular, 0.1–0.2 mm in diam., epidermal cells small and more or less thick-walled, central strand present but often weak. Pseudoparaphyllia narrowly foliose, 2–4 cells wide at base. Rhizoids axillary, restricted to lower stems near base of branches, red, papillose. Leaves narrowly lanceolate to ovate-lanceolate, secund and usually falcate, 1.0–1.5(–1.8) mm long, 0.25–0.75 mm wide at base, base rounded, not decurrent, slightly concave; upper portion of leaf tapering evenly, narrowed to acuminate to piliferous apices; costa weak and double or often absent; margin entire; cells in median portion of lamina linear to subvermicular, 60–120 µm long, 5–8 µm wide, narrow at both ends, moderately thick-walled, not porose; cells at base of leaves wider and shorter, becoming porose; alar cells not differentiated. Propagules, when present, axillary and filamentous or ± fusiform.

Perichaetia lateral on stems; perichaetial leaves lanceolate, narrowly acute at apices, to 1.7 mm long, 0.38 mm wide; ecostate, entire; laminal cells elongate and moderately thick-walled. Calyptra large, cucullate, c. 3 mm long. Setae 1.0–1.5 cm long, reddish brown. Capsules cylindrical, erect, often slightly to clearly asymmetrical, urn about 2 mm long; operculum bluntly conic; annulus well developed, deciduous; exothelial cells rectangular, 25–50 µm long, c. 20 µm wide, moderately thin-walled. Peristome double, hypnaceous; outer teeth c. 1 mm long; endostome segments a little shorter than outer teeth; cilia 1 or 2, nodose, equal to the segments or rudimentary. Spores spherical, 10–18 µm in diam., smooth. No chromosome number recorded. Figs 1–4.

Distribution: Australia (New South Wales (alpine), Victoria, Tasmania and Macquarie Is) and New Zealand (North, South, Stewart, Auckland and Campbell Is.). In Australia *Austrohondaella* occurs in scattered pure and dense mats on dolerite karst and also on basalt where it is found on moist exposed rock faces and in crevices. Also, it is occasionally epiphytic on semi-shaded tree trunks (e.g. *Acacia*, *Pomaderris* and tree ferns) and on fallen logs in disturbed *Nothofagus* or wet sclerophyll forest. On the mainland it occurs from 80–1700 m, while on the island of Tasmania is recorded from 20–1000 m. In New Zealand it occurs in scattered or dense mats primarily on mesic or rather dry rock, but in the northern and southern portions of its range it also occurs on tree trunks. It is best developed in montane to alpine vegetation. *Austrohondaella limata* occurs on a wide range of rock types but is most frequent on limestone and marble; it occurs less frequently on greywacke, basalt, conglomerate, granite, diorite and on humus. When epiphytic at the extremities of its range the host species include the gymnosperms *Prumnopitys taxifolia* and *Dacrydium cupressinum*, as well as

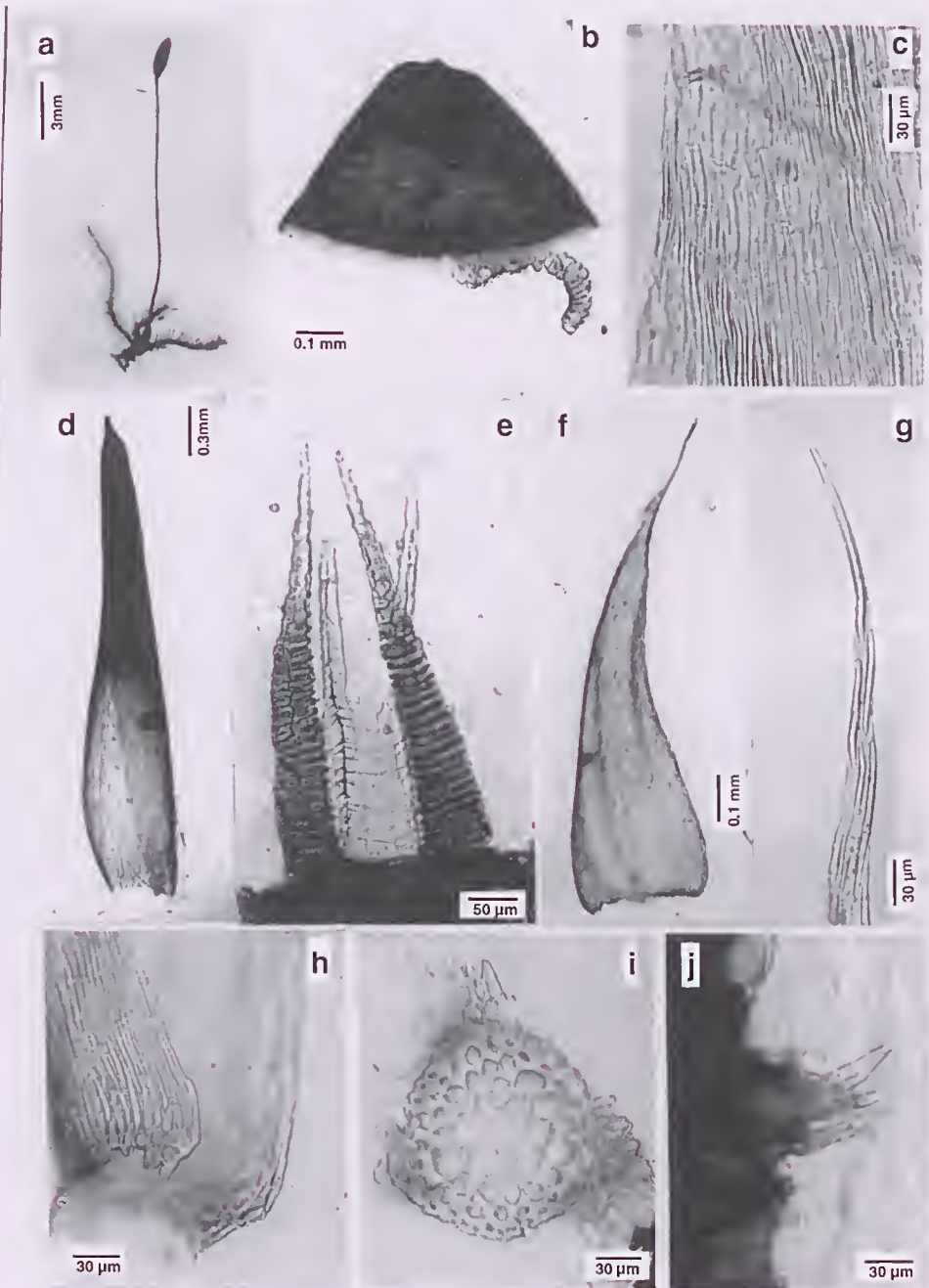


Fig. 1. *Austrohondaella limata*. a, type plant of *Hypnum limatum* with sporophyte; b, operculum with a part of annulus; c, median laminal cells of type; d, calyptra; e, peristome teeth and rudimentary cilia; f, a leaf; g, apex of leaf; h, cells at base of leaf; i, cross-section of stem; j, pseudoparaphyllia. (a, c, f, g, i and j from the isotype of *Hypnum limatum* in NY; b, d, c and h. from *H. Streimann* 58986 in NICH; all photographs by Z. Iwatsuki).

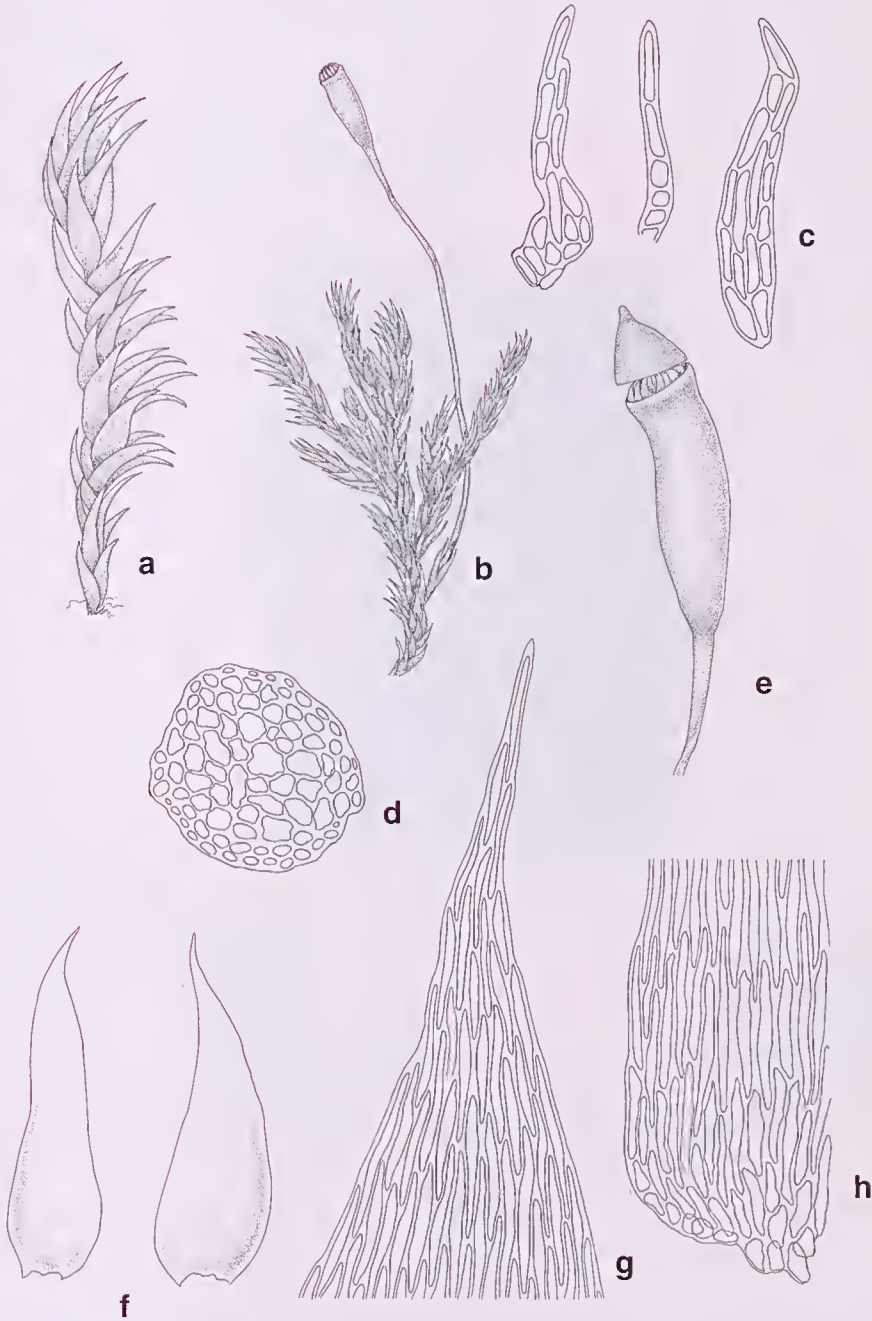


Fig. 2. *Austrohondaella limata*. **a**, sterile shoot; **b**, portion of fertile plant; **c**, pseudoparaphyllia; **d**, stem in cross section; **e**, moist capsule with operculum; **f**, stem leaves; **g**, apex of stem leaf; **h**, alar cells of stem leaf. (**a**, **b**, **d**–**h** from *J. Child* 6212 ex Otago Peninsula, N.Z. (CHR 429281); **c** from *A.J. Fife* 7546 ex Mt Arthur range (CHR 438862); drawn by Rebecca Wagstaff).

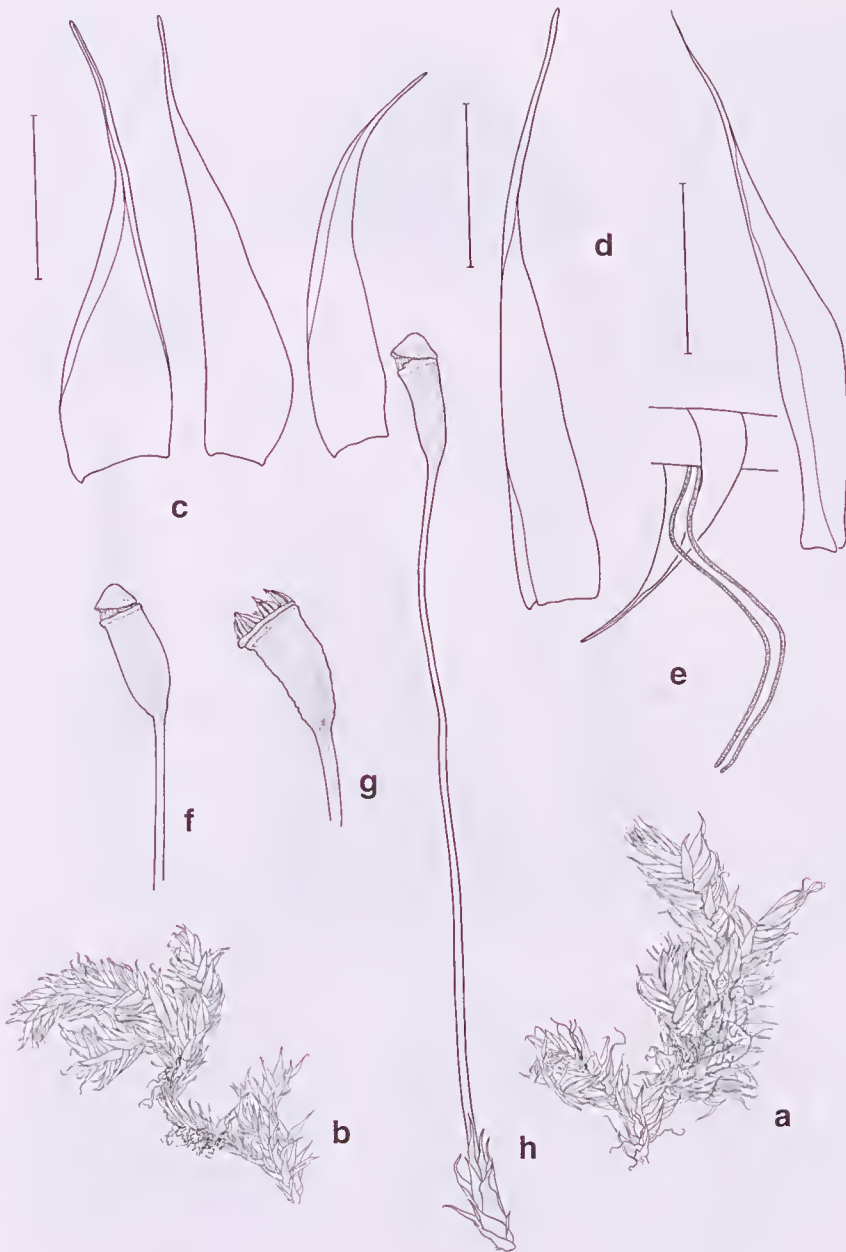


Fig. 3. Drawings of type specimens. a, habit of isotype of *Hypnum terrae-novae* var. *australe* (NY); b, habit of holotype of *Isopterygium acuminatum* (HO); c, branch leaves of *H. terrae-novae* var. *australe*; d, branch leaves of *I. acuminatum*; e, stem, leaf and axillary rhizoids; f, capsule with operculum of *H. terrae-novae* var. *australe*; g, capsule showing peristome of *H. terrae-novae* var. *australe*; h, sporophyte showing perichaetial leaves and capsule of isotype of *I. limatum* (NY). (a, b, f, g, h drawn by C. Wardrop, c, d, e by H. Ramsay). Scale bars: 0.5 mm for leaves, 1mm for other drawings.

Beilschmiedia tawa, *Carpodetus serratus*, *Melicytus macrophyllus* and *Myrsine australis*. It is apparently more common on the South Island than the North Island and ranges from near sea level to c. 1650 m (but is common below c. 700 m only from Canterbury southward). Figs 5, 6.

In Scott and Stone (1976), Lewinsky suggested that *Isopterygium acuminatum* from Tasmania was merely a growth form of *Isopterygium limatum*. We have examined type material (Ramsay & Seur 1994) of *I. acuminatum* as well as many Tasmanian collections and we concur with Lewinsky's suggestion.

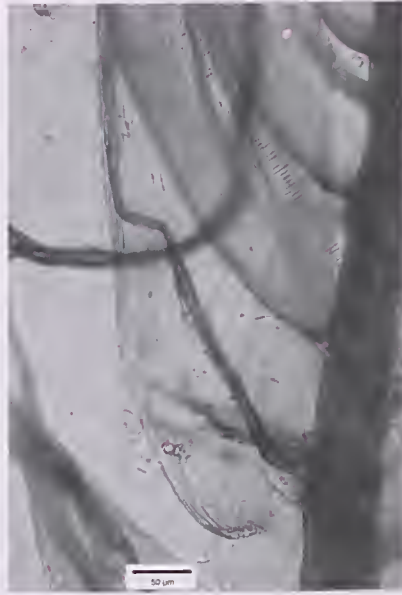


Fig. 4. *Austrohondaella limata* showing rhizoids in axil of lower stem leaf. (from R.D. Seppelt 12897 in NICH; photograph by Z. Iwatsuki).



Fig 5. Australian distribution of *Austrohondaella limata*.



Fig. 6. New Zealand distribution of *Austrohondaella limata*.

Selected Specimens: **Australia.** **New South Wales:** Yarrangobilly Caves, *W.W. Watts* 8822, 8823, 8807 (NSW). **Victoria:** Sabine Falls track, Angahook-Lorne state forest, 19 km NE of Apollo Bay, *H. Streimann* 58986 (NICH, CANB); Bulga National Park, Lyrebird-Ash Tracks, *H. Streimann* 51621 (NICH, CANB); Mt Cole State Forest, 27 km E of Arrarat, *H. Streimann* 54841 (CANB); Maits Rest, Ocean Road 10 km W of Apollo Bay, *H. Streimann* 58644 (CANB). **Tasmania:** Williamsford - Montezuma Falls Track, *H. Streimann* 59570A (NICH, CANB, HO); North Dundas, W.A. *Weymouth* 3037 (HO); Mt Rumney, *R.A. Bastow* 199 (HO); Western Tiers, northern side of Projection Bluff, *R.D. Seppelt* 12897 (NICH, HO); Lake Dobson Rd, Mt Field NP, *D.H. Vitt* 29139 & *H.P. Ramsay*, (CANB, HO); Pipelma track, Mt Wellington, *A.V. Ratkowsky* H292 (CANB, HO); Roger River 6 km SW of Trowatta, *A. Moscal* 10572 (CANB, HO). **Macquarie Island:** Green Gorge, *R.D. Seppelt* 14306 (NICH, CHR 413613); Prion Lake, *R.D. Seppelt* 011342 (NICH); Douglas Point, *R.D. Seppelt* 12445 (NICH).

New Zealand: **North Island:** Maunganui Bluff, *A.J. Fife* 10705 (CHR 570024); Coromandel Peninsula, Moehau, *L.B. Moore* 254 (CHR 593700A, WELT M15107); Gisborne, Lake Waikaremoana, Panekiri Range, *G.O.K. Sainsbury s.n.*, 3 Mar 1940, (WELT M015126); Central Volcanic Plateau, Mt. Hauhungatahi, *J.K. Bartlett* A11 (NICH); Tongariro National Park, southwest flank of Mt. Ruapehu, Blyth Hut track, *A.J. Fife* 9803 (CHR 512033); NW Ruahine Range, Ohutu Ridge, *B.H. Macmillan* 92/8 (CHR 482367). **South Island:** Mt. Burnett, near Collingwood, *A.J. Fife* 11734 (CHR 581481); N.W. Nelson, Cobb Valley, *J.K. Bartlett* A7 (NICH); N.W. Nelson, Arthur Range, Mt. Hoary Head, *J.K. Bartlett* 19388 (NICH); Goulard Downs, Big River, *M.J.A. Simpson* 7278 (CHR 106958); Mt Owen, Sanctuary Basin, *A.J. Fife* 5061 (CHR 103645); Marlborough, Woodside Creek, *W. Martin* 593 (CHR 587227); Canterbury, Arthurs Pass National Park, Bealey River Gorge, *V.O. Heinz* 96/29 & *B.H. Macmillan* (CHR 510127, NICH); Joyces Creek, tributary of Waimakariri River, *B.H. Macmillan* 75/143 (CHR 264840); Westland, Kelly's Hill (=Kelly Range), *S. Berggren* 2805 (NICH, WELT M1050); Otago, Otago

Peninsula, near Larnach's [Castle], *J. Child* 6212 (CHR 429281, NICH); Dunedin, Tysons Wall, Leith Valley, *J. Child s.n.* (NICH 300228); Dunedin area, Swampy Summit, *W.B. Schofield* 49995 (NICH); Akatore Stream, south of Dunedin, *K.W. Allison* 1414 (CHR 577752); Tautuku Bay, Lake Wilkie, *W.B. Schofield* 49432 (NICH); Southland, Garvie Mountains, above Lake Scott, *D. Glenn* 6393 (CHR 509918); Bluff-Invercargill - Winton, *S. Berggren s.n.*, 1874 (NICH 278551). **Stewart Island.** Port Pegasus, *W. Martin* 275.3 (CHR 577758); summit of Tin Range, *W. Martin* 275.20 (CHR 593701). **Auckland Islands.** Auckland Island, Hanfield Inlet, *D.H. Vitt* 10176 (CHR 448072). **Campbell Island.** Perseverance Harbour, *D.H. Vitt* 2945 (CHR 577763).

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